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VOL. LV DECEMBER, 1945. No. 12

A REVIEW OF TUBERCULOSIS IN THE FIELD OF OTOLARYNGOLOGY FOR LATE 1944 AND EARLY 1945.

FRANK R. SPENCER, M.D.,
Boulder, Colo.

Rubin[1] believes there are too few reliable symptoms in early tuberculous otitis media to permit an early diagnosis. The absence of pain misleads the patient until discharge is accidentally discovered. He writes that Schwartze, as quoted by Bruehl, was the first to describe small miliary tubercles in the drum. When these break down perforations result. As a rule by the time a physician sees the patient the perforations are present. Rubin believes neither the otoscopic picture nor the functional tests help very much in making an early diagnosis.

Rubin has included in his article two case reports. He aspirated pus from the middle ear with a syringe. The animal inoculation was positive for tuberculosis in each case. He admits that two cases are too few to permit accurate conclusions, but he recommends to other otologists his method of aspirating the pus from the middle ear.

Aspiration of pus from the middle ear for diagnosis, either with a syringe or an ear aspirator, is not new. It offers the surest method of obtaining a positive culture and a positive animal inoculation. The article is short, but fairly complete.

Hinshaw and Feldman[2] have carried out experiments to test the therapeutic value of streptomycin in the treatment of clinical tuberculosis. They emphasized the importance of

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observing tuberculous patients over a long period of time. They were unable to do this, hence the preliminary report. They expect to make a more detailed report later.

Streptomycin is an antibiotic substance developed in the laboratory of Dr. S. A. Waksman and his associates and first described in January, 1944. The bacillus of tuberculosis is one of the organisms susceptible to its action in vitro. Streptomycin appeared to be more effective than any of the sulfonamides used in the treatment of experimental tuberculosis and much less toxic for guinea pigs.

Hinshaw, Feldman and their associates treated 34 patients with tuberculosis from December, 1944, to November, 1945. At first too small doses were used. Larger doses were used beginning in January, 1945. They believe 800,000 S units per 24 hours is the minimum therapeutic dose. Usually patients have been given 1,000,000 to 2,000,000 S units per day. If 100,000 to 150,000 S units are administered every three hours by intramuscular injection, a continuous blood level will be maintained, which will not be lower than 5.0 to 10.0 S units per cubic centimeter of serum at any time. Streptomycin is a drug of low toxicity for man. Four patients apparently acquired sensitization with violent febrile reactions. Desensitization was readily accomplished by administering small doses at first.

Streptomycin did not appear to have any rapidly effective curative action but extensive and progressive lesions of recent origin did tend to improve promptly. Regions of fibrosis and cavitation may not disappear despite large doses and the sputum may continue to be positive. One patient had laryngeal tuberculosis. While the reproduction of mycobacterium tuberculosis may have been inhibited, there was no convincing evidence of rapidly effective bactericidal action.

The authors have written an excellent article and it should be read by all physicians interested in tuberculosis. Their sincerity and frankness regarding the limited improvement of tuberculous lesions is commendable. They frankly admit that a longer time for treatment and more patients for observation will be required before they can make a final report.

If more research could be as thoroughly and systematically carried out as that of Hinshaw and Feldman, medical science would attain even a higher level than it has.

Bertrand, Fuks and Levit[3] reported a child, two years old, who had been in the hospital earlier because of typhoid fever, at which time the Mantoux reaction was negative. Early in October, 1943, the present illness commenced, with fever, diarrhea and cough. He was examined by an otorhinolaryngologist who found nothing to explain the symptoms. At the end of the month, however, there were enlarged glands in both sides of the neck and in the retromastoid region. Both ears were painful. On Nov. 3, a small paracentesis released a small quantity of purulent secretion. As this brought no relief, a mastoid operation was performed two days later. The bone was very friable but there was not much pus. As the bones did not resemble those of acute mastoiditis, the scrapings were inoculated into a guinea pig which, when killed, revealed disseminated tuberculosis.

Immediately after the operation the patient's temperature was reduced. Wollmer's patch test was positive. An X-ray of the chest on Dec. 22 did not show any pathological conditions. On Dec. 27, gold treatment was started.

At the present time (November, 1944) the glandular swellings have disappeared and there has been no fever for eight months. Mantoux reaction (Oct. 18, 1944) was positive in dilutions up to 1:10,000,000. Another X-ray on Oct. 16, 1944, showed a normal thorax and no pulmonary lesions.

This case is not unusual, but quite typical. The case report is brief.

Cote[4] believed this condition was first described by Isambert in 1876 and is sometimes called Isambert's disease. Two cases were reported:

Case 1: A woman, age not given. Her previous and family history were irrelevant. Her parents were living and well, as were four sisters and three brothers. Her illness began in December, 1942, with tickling and burning of the throat, which rapidly grew worse until swallowing became painful.

It was first treated as tonsillitis but continued to get worse, emaciation increased and there was painful dysphagia. She entered the hospital on Jan. 28, 1943. Palpation, percussion and auscultation gave negative results. The X-ray showed slight opacity in the right lung and on the left a quantity of small spots at the level of the second and third intercostal spaces. Dysphagia, extending to liquids, could only be relieved by cocaine anesthesia of the pharynx. A large, irregular, superficial ulceration with fine granulations covered the entire soft palate, tonsils and entrance to the larynx.

Diagnosis: Acute miliary tuberculosis of the pharynx.

In spite of many forms of treatment, the pain and weakness increased. Death, Feb. 12, 1943.

Case 2: A woman, 18 years old, entered the hospital on April 29, 1943, with a diagnosis of ulcerocaseous tuberculosis. Examination of the upper respiratory tract showed an absolutely normal larynx and pharynx. In November, however, she began to feel some pain in the throat. Another examination, on Dec. 13, 1943, showed fine granulations scattered over the tonsillar region. The posterior wall of the pharynx and the entrance to the larynx were not involved. The ulcerations spread rapidly until finally the whole pharyngolaryngeal area was a single tremendous superficial ulcer. There was agonizing pain and dysphagia; it became impossible to feed the patient, and she died on Jan. 21, 1944, in a condition of complete cachexia.

The author does not consider this a rare malady and says it is seen at his hospital as a local manifestation of a general pleuropulmonary granulitis in about 10 per cent of the cases. It must not be confused with the usual laryngeal tuberculosis or with angina. The two most striking symptoms are the excessively painful dysphagia and the rapid progress of emaciation, usually leading to death.

It is quite likely that the lesions in the pharynx and larynx were late terminal lesions, which explains the rapidly fatal termination.

In some countries only late terminal cases are admitted to

hospitals and sanitoria, so that only late and advanced cases are seen by the staff.

Rothstein and Pirkle[5] have found laryngeal tuberculosis most frequently in patients with cavitation and positive sputum. During healing, dense scar tissue formed in the larynx in their patients.

They reported one case of a white female, age 30, admitted to the sanitorium with far advanced pulmonary tuberculosis without cavitation. The arytenoids, true and false cords were thickened. Left pneumothorax therapy was started in three months after admission. In eight months the right phrenic nerve was crushed. In 12 months there were multiple small cavities in the right upper lobe. There was at this time considerable laryngeal stenosis. In 15 months the patient suffered from aphonia, stridor and dyspnea. Tracheotomy was performed. In three and a half years after admission the patient was much better and was taking some exercise daily.

The authors have nine references including the excellent article by Myerson on this subject.

The article is rather short and to the point. The case was well studied from all angles.

During the past year very little which is new has been added to our knowledge of tuberculosis unless streptomycin proves to be of benefit. This gives a ray of hope for a remedy which will be as beneficial against tuberculosis as the sulfa drugs and penicillin have been against acute infections. The war has almost stopped medical research. With the ending of the war, medical research should increase rapidly, especially in the United States.

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WAR INJURIES TO THE AUDITORY APPARATUS. CLINICAL AND AUDIOMETRIC OBSERVATIONS.

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Chicago, Ill.

The War Department is keenly interested in problems of hearing impairment in the armed forces. Years of research in Army, Navy and Marine laboratories have been directed toward counter-measures to provide ear protection. Helmets have been designed; earphones, ear obturators, gun shields and gun charges have been studied with regard to minimizing ear damage. Directives have been issued outlining principles of protection, gun position, etc., to protect combatants from the effects of blast. Men long in action have been given rest periods to permit recovery from temporary injuries to the ear. All this has had its beneficial effect; still, the incidence of ear casualties is high.

The records in our series show ear damage in 5.8 per cent of the cases admitted to the 108th General Hospital.* Without question, the incidence is influenced by the period in which the patient is seen by the Army otologist. These cases were seen 10 days (average) after injury. The extremes varied from one to 144 days. More accurate figures could probably be obtained at a later period, after the patient's more serious wounds no longer engaged his attention; temporary deafness of a short duration would not be included in this figure.

A preliminary report of clinical and audiometric findings in a large group of cases is presented at this time. Additional observations, clinical and experimental, are in progress which will be the basis of a supplementary report.

*This figure reflects only the "known" aural casualties seen in the clinic after history and examinations of ear, nose and throat. Hearing function was evaluated in a manner later described. On this basis, a diagnosis was made. Only cases of this nature are included in this report since it was physically impossible to triage the entire group of 36,000 admissions.

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The number of aural casualties returning from the front presented a problem of classification in the early period of operations. The multiple variations in the type and degree of deafness under similar etiological conditions was confusing. The vital need of accumulating pertinent data relative to acoustic trauma incurred in combat was obvious.

One hundred and seventy* case records of soldiers complaining of hearing impairment caused by explosions were reviewed. Information acquired from the analysis of these cases suggested the wisdom of dividing them into specific categories. These divisions will be identified in their proper order.

The form (see Fig. 1) used in tabulation of data for this series of cases made possible the collection of adequate information relative to the conditions considered in this study.

It will be noticed that time-consuming methods have been reduced by the opportunity to indicate quickly the time, age and conditions of past diseases related to the ear's function. If the discharging ear, and/or other diseases, had an intermittent character, appropriate intermittent dashes were used to indicate this fact. The second checked area provided information relative to time, campaign, duration of action, type of weapon used, etc. In the event the soldier was wounded, appropriate notation was made in this part of the record giving time (month and year) and place (theater of war). Re-entry into combat was similarly noted. In this part of the form essential information regarding the traumatizing effect of the soldier's own weapons was given. The next section of the form provided for pertinent data relative to enemy source of the acoustic traumatizing agent. The clock-like diagram at the right of the form permitted an easy and accurate illustration of the course and area of detonation of the shell or traumatizing agent in relation to the position of the soldier.

Under existing conditions of war, it is necessary to include

*Not included in this report.

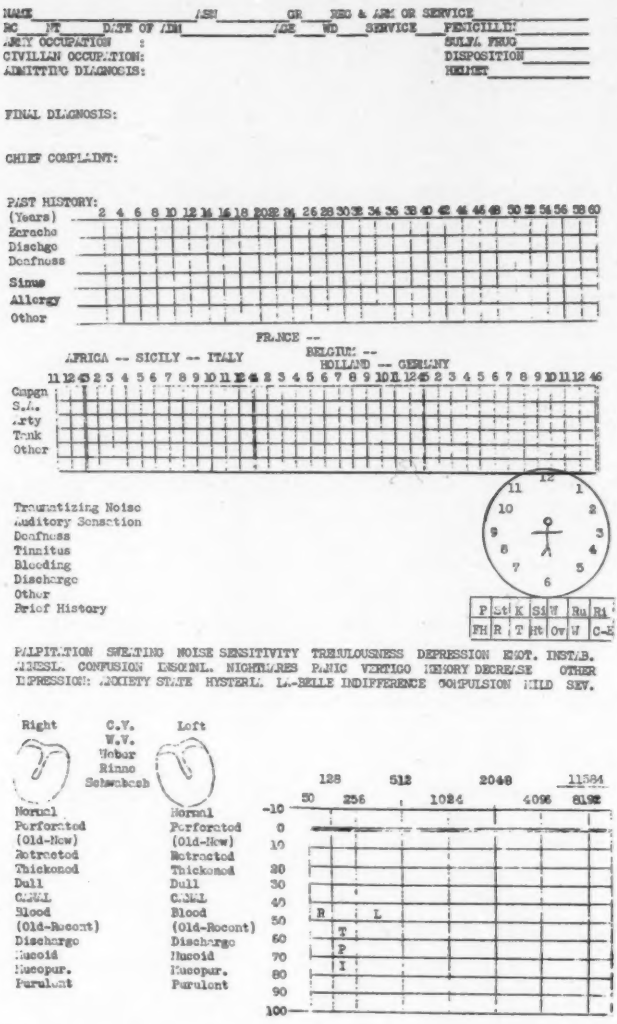


Fig. 1. Form employed for the tabulation of data under consideration in the problem.

a screening impression of the individual's adjustment to his environment.

The eardrum changes were sketched in the schematic representation shown on the form, and the condition of the eardrum and canal was indicated by checking the applicable word or words in the proper column.

The only departure from the usual audiographic form employed is the inclusion of the letter R (right), L (left), T (tinnitus), P (pitch) and I (intensity). These phenomena were listed at the time of the audiometric test if the patient volunteered the information that the test sound was similar to his subjective tinnitus. In this event an additional effort was made to determine and record the intensity.

The essentials of good audiometry were followed. The operator of the audiometer was trained in these essentials and personally conducted all tests; *i.e.*, whisper and conversational voice, Weber, Rinne, Schwabach, and finally the audiometric tests. All tests were conducted in a soundproof room. Calibration of the audiometer was checked at the beginning of each day's work. The first tone used was a 1,024 cycle, proceeding in sequence to the highest frequency. In this way fatigue to the ear as a result of a prolonged period of testing the lowest to the highest frequency was avoided. A reasonably loud signal, based upon the apparent hearing loss (to whisper or conversational voice) was given. Attenuation was introduced in 5 db. steps until no response was indicated. The maneuver was repeated until uniform response was obtained three times. Interruption of the sound was frequently employed, care being taken to avoid audible or visual recognition of the process. Masking was used in those cases demonstrating a disparity of 30 db. or more between the two ears. In no case did the masking intensity reach a level that would unfavorably influence the ear under test.

Group I was subdivided into three sub-groups as follows:

Sub-group "A" — Complaint and noncomplaint ears; no effort is made towards separating the ears on the basis of subjective and objective criteria.

Sub-group "B" — Complaint ears — limited to subjective criteria.

Sub-group "C" — Noncomplaint ears — limited to objective criteria.

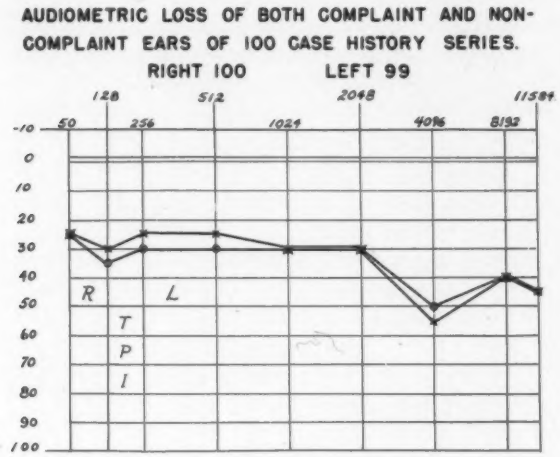


Fig. 2. Group I (Sub-group "A"), 100 right ears, 99 left ears.

Statistics of Group.

Average age	26 years
Extremes of age	19 to 41 years
Average combat days	122 days
Extremes of combat days	1 to 900 days

It will be observed that 100 right ears are listed, but only 99 left ears. One ear of the 200 in the series was discovered later to possess an impairment existing before induction and therefore was disqualified from analysis of the group.

Requirements fulfilled by Group 1 are as follows:

1. Battle casualty — wounded in action.

2. Chief complaint (*i.e.*, purpose of coming to the otologist) had to suggest recently acquired battle injury to the ear.

3. No history of ear disease in childhood or exposure to acoustic trauma incurred in civilian life.

4. Clinical examination demonstrating no evidence of old ear disease.

The foregoing information may be ascertained from the patient's history and checked against our knowledge of those signs common to chronic ear disease. It is true that the patient's account of his civilian occupation could not be adequately evaluated, but there is little evidence to suggest that the soldier would connect his civilian occupation with the significance ascribed to this factor.

The curve for Sub-group "A," Group I (see Fig. 2) is the threshold response of 100 cases in which each frequency of the tested right and left ear was listed in separate columns and an average obtained for each frequency. In other words, no exclusion of the noncomplaint ear is made in this study of a composite curve, right and left, for the 100 men tested.

Requirements of Group I (and the sub-group) specifically failed to include any factor regarding the type of audiometric curve, *i.e.*, the type of curve was not a criterion in the selection of cases for this group. It is interesting to observe the curve obtained under these conditions inasmuch as the extremes of all the test frequencies ranged from zero to the maximum output of the intensity supplied by the audiometer.* The maximum threshold elevation at 4,096 cycles under these conditions is impressive. Further, the consistency of the parallel of the right and the left ear response is striking when one considers the possibilities of digression in a computation of figures extending into hundreds of thousands.

Sub-group "B," Group I (see Fig. 3) was obtained in the following manner:

1. Deleting those ears having an impairment as manifested by a tonal dip at 4,096, but not producing subjective symptoms; and *2.* under the same conditions of obtaining the group threshold outlined for Sub-group "A." In this fashion a response to the test frequencies is obtained for the subjective or "complaint ear" only.

The curve obtained using only the complaint ear demon-

*Maximum intensities at various frequencies:

*50 cycles,	50 db.	1,024 cycles,	100 db.
128 cycles,	80 db.	2,048 cycles,	100 db.
256 cycles,	90 db.	4,096 cycles,	90 db.
512 cycles,	100 db.	11,584 cycles,	60 db.

strates a greater tonal dip at 4,096, but of greater interest is the evidence suggesting the inclusion of the 8,192 cycle threshold elevation (see Fig. 3). This is thought to be the result of exposure to acoustic energy of greater intensity or more prolonged exposure. The maintenance of the parallel tendency for the approximation of the curve of the right and left ears is again demonstrated. It will be observed that there exists a threshold elevation of a general nature for all frequencies as compared to the level of the same frequencies of Fig. 3.

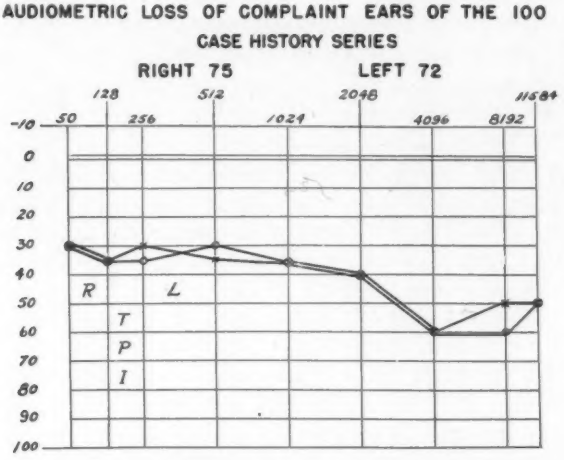


Fig. 3. Group I (Sub-group "B"). 75 right ears, 72 left ears. Statistics same as Sub-group "A."

Note greater tendency of the right ear to engage the soldier's attention in "subjective" ears: Right 75 to left 72. Observe change when compared to "objective" ears, Sub-group "C."

The tendency for the curve to show a gradual "down hill" fall is noticeable when compared to the relative flatness of the curve for Sub-group "A" which drops off sharply at 2,048 cycles. This discrepancy may be explained on the basis that the curve of the combination of the "complaint" and "non-complaint" is elevated by the lesser damaged "noncomplaint" ear. From this it follows that the curve of the threshold response when tested by pure tone frequencies of an ear

severely traumatized will demonstrate a general depression in all frequencies with the maximal dip at 4,096 cycles, followed in turn by 8,192 and 2,048 cycles.

Sub-group "C," Group I (see Fig. 4) using the same individuals given in Sub-groups "A" and "B" presents the curve of those ears demonstrating acoustic injury as manifested by high frequency tonal dip at 4,096. This group of ears provoked no subjective complaint. The impairment would have

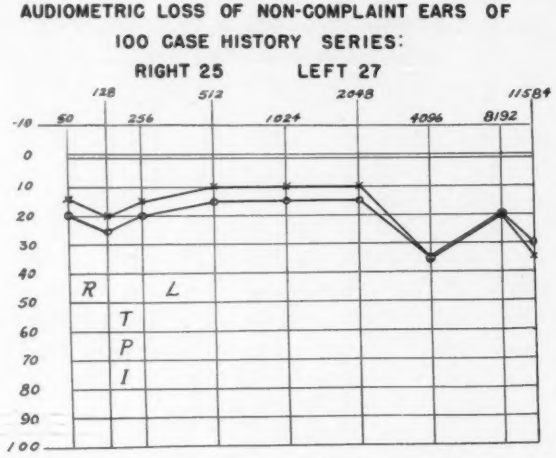


Fig. 4. Group I (Sub-group "C"). x = left ear. 0 = right ear. 25 right ears, 27 left ears.

Statistics same as Sub-groups "A" and "B."

Note reversed condition in contrast to Sub-group "B." In the noncomplaint ear the left is 27 compared to 25 of the right. Explanation: left ear damage not known to the patient. Likely caused by traumatic injury produced by soldier's rifle fire.

been missed in these ears if the audiometer test had been limited to the ear producing subjective symptoms.

The contour of the threshold curve (see Fig. 4) further emphasizes the evidence indicative of early acoustic injury to be foreshadowed by a tonal dip at 4,096 cycles. Of interest is the shallow dip appearing at 128. I am unable to explain this drop, but attention is directed to the regular recurrence

of the phenomenon in all the curves suggesting the acoustic trauma pattern.

Group II (see Fig. 5) is comprised of officers admitted to the hospital for wounds other than those involving the ear, that were sustained on the battlefield. All individuals included in this group were volunteers responding to my

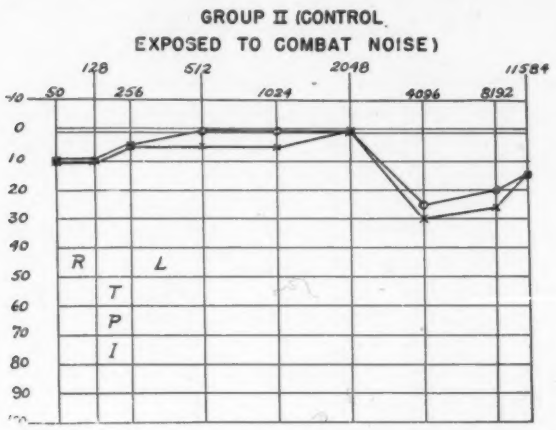


Fig. 5. Group II—(25 cases with no ear complaint; exposed to blast). 25 right ears, 25 left ears.

Statistics.

Average age	26 years
Extremes of age	19 to 45 years
Average combat days	70 days
Extremes of combat days	2 to 150 days

request for men wounded in action and free of ear complaints. Requirements for this group were:

1. Battle casualty, wounded in action.

2. No past history of ear disease.

3. No past history of exposure to noisy civilian environment.

4. Clinically normal ears, nose and throat.

The tonal dip of these officer controls and general contour of the curve is similar to the curve presented in Sub-group

"C," Group I. The approach to the normal zero line is obviously superior in this control group presenting no ear complaint; however, the shadow-like quality of the two curves is demonstrated. The tonal dip is maximal at 4,096 and secondly at 8,192 cycles. This is more interesting if one keeps in mind the absence of any subjective injury to the ear. It must be added that a few of these cases recalled an occa-

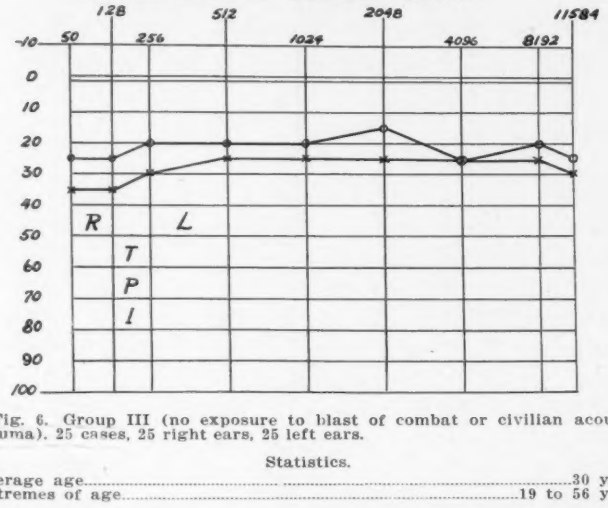


Fig. 6. Group III (no exposure to blast of combat or civilian acoustic trauma). 25 cases, 25 right ears, 25 left ears.

Statistics.

Average age	30 years
Extremes of age	19 to 56 years

sional "singing noise" in the ears after exposure to explosions, but not until a leading question was asked. None of them complained of a hearing impairment, and all had a 15/15 response to the army whisper test.

A comparison of the statistics of Group I and Group II will show a satisfactory parallel for age. The nature of the environment is not a factor since these officers came from the same battlefields at the same time the enlisted men entered the hospital. The officers had similar wounds to those of the enlisted personnel, except for this group's prerequisite

of "no hearing complaint." All groups were well under the age in which high tone deafness of a "nerve type" would be associated with the normal decline of hearing acuity for high frequencies in the individual past 50.

Group III (see Fig. 6) is comprised of all cases seen in the out-patient clinic for ear complaints, other than those associated with battle exposure. They have been labeled the Tom, Dick and Harry group — a categorical identification suggested by Major Hoople. Requirements for this group:

1. No exposure to noise of combat.

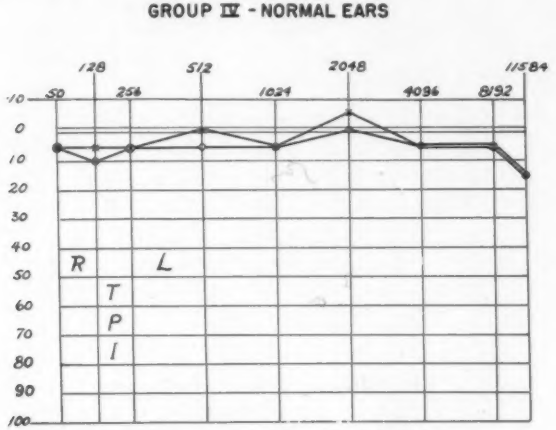


Fig. 7. Group IV (no combat, past or present ear disease and no ear complaint). 25 cases, 25 right ears, 25 left ears.

Statistics.

Average age	29 years
Extremes of age	20 to 44 years

2. History of past or present ear disease.

3. No exposure to acoustic trauma either in army or civilian life.

The absence of the tonal dip at 4,096 is recognized; in fact, the curve suggests a general uphill tendency (see Fig. 6). The cases in the main were service troops engaged in supply and administrative work. Their age group is five years

higher in comparison to the previous groups. The cause of their visit to the clinic can best be described as those causes that bring the patient to the general dispensaries in peacetime, presenting essentially the chronic ear diseases associated with long-standing disease of the neighboring tissues, usually with a secondary conduction type deafness.

Group IV (Fig. 7) is comprised of those normal individuals fulfilling the following requirements:

1. No past personal or family history of ear disease.
2. No present ear complaint.
3. Clinically negative to ears, nose and throat examination.
4. No civilian or army exposure to acoustic trauma.

This group demonstrates the curve near the zero base line. These men (in some cases women) were not only a control on all previous groups, but were valuable also in acting as a check on the efficiency of the technician, the apparatus employed and the conditions of an external nature that might unfavorably influence the "soundproof" room. In all operating days, this type of individual was used at the beginning of the day's procedures.

The literature reflects a divided opinion of the subject of increased or decreased resistance to acoustic trauma in those ears having hearing impairment as a result of childhood and/or existing ear disease. Controversial issues of a similar nature exist also in otologic observations in those cases of defective hearing caused by acoustic trauma incurred in civilian occupations.

Thirty-eight cases (Group V, Fig. 8), with positive histories and clinical findings indicative of defective hearing caused by disease and/or acoustic trauma incurred before exposure to battle noise, were studied. The average age of 26 conforms favorably with the age given in other groups. In this manner the influence of high tone loss occurring in late adult life may be considered insignificant. The average number, 116 combat days, compares favorably with 123 combat days for Group I (see Fig. 8). Inspection of the threshold

curve of these cases should be compared to the cases of Group I, Sub-group "B." It will be noticed that a similar pattern exists from 2,048 to 11,584 cycles. If acoustic trauma is characterized by a tonal dip at 4,096 cycles, it follows that hearing impairments existing prior to the traumatizing noise of battle as demonstrated by this group of cases are as vulnerable to the effects of blast as normal ears.

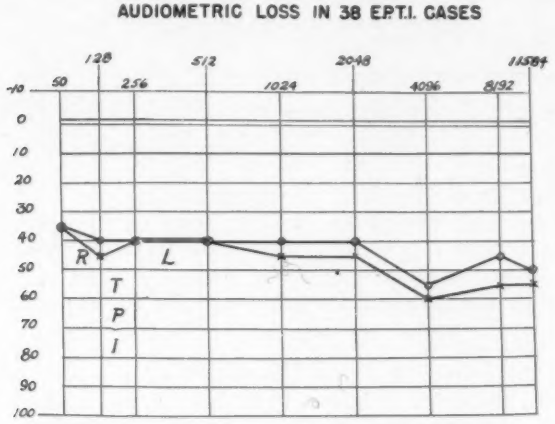


Fig. 8. Group V. 38 cases, 38 right ears, 38 left ears.

Statistics of Group.

Average age	26 years
Extremes of age	19 to 42 Years
Average combat days	116 days
Extremes of combat days	2 to 805 days

The generalized flattening below 2,048 cycles is comparable to the average of Group III and Sub-group "A." This would indicate the influence of the battle incurred threshold increase superimposed on a low tone deafness. Thus it would seem that soldiers with previously incurred hearing impairment are as sensitive to trauma as those with normal hearing.

A small series of ears were studied in an effort to determine the influence of the time factor or the duration of exposure as related to the threshold curve when tested under the conditions previously described. To this end the curve

of 30 ears having 150 days combat was graphically recorded (see Fig. 9).

It will be observed that this curve compares favorably with previous curves. The maximal dip is at 4,096 cycles and the threshold elevation is not significantly increased. An additional group of these cases having an average of 501 combat

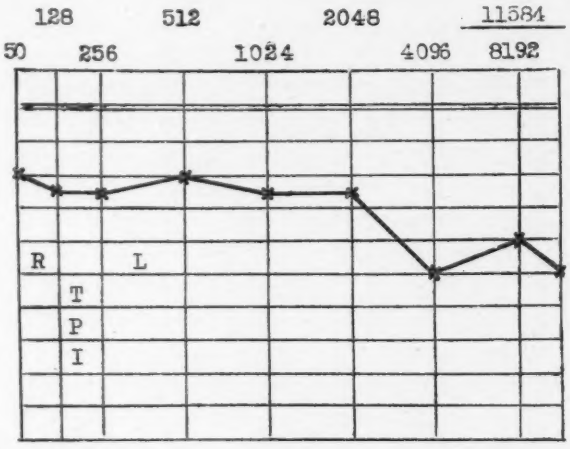


Fig. 9. Threshold curve of 30 ears (no history of previous ear disease or civilian trauma).

Statistics.

Average age	27 years
Extremes of age	20 to 40 years
Average days of combat	287 days
Extremes of days of combat	150 to 800 days

days is represented in Fig. 10. Whereas the dip at 4,096 cycles demonstrates an increase of 5 db., the general pattern is not unlike the curve of Fig. 9 and previously presented curves.

It is admitted that the number of cases analyzed in this category is small, and no dogmatic statement can be made on this basis. It would seem, however, that these two curves (see Figs. 9 and 10) would indicate the absence of an accumulative effect as a factor in the production of acoustic trauma.

It has been impossible at this time to present the interesting finding suggested by the threshold curve of those cases complaining mainly of tinnitus. In the main, those cases demonstrated a maximal threshold loss for 11,584 cycles; rarely did a patient having tinnitus as the chief complaint fail to demonstrate this high frequency threshold elevation.

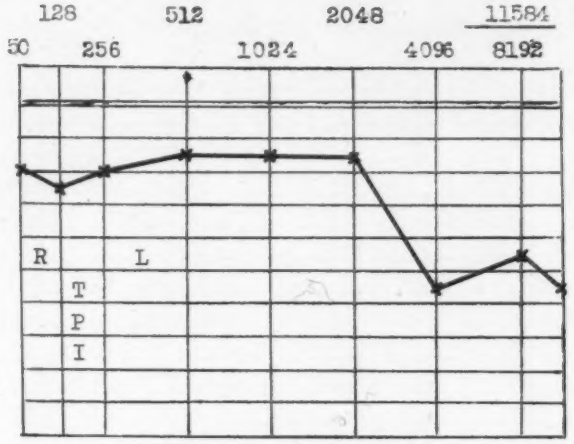


Fig. 10. Threshold curve of nine ears (no previous ear discharge or acoustic trauma).

Statistics.

Average age	30 years
Extremes of age	22 to 36 years
Average combat days	501 days
Extremes of combat days	365 to 900 days

Another observation found in the review of these case records was the pattern of the curve found in patients suffering from "concussion." In this group the major complaint ranged from a total absence of hearing to a generalized flattening of the curve from 512 to 2,048 cycles. It will be timely to recall that these frequencies possess the greatest range of intensity output of the audiometer employed in this investigation. It will be remembered also that the greatest dips of present cases have this characteristic, *i.e.*, maximum threshold increase of the high and low frequencies.

Those individuals whose deafness is on a functional basis also present a threshold curve ranging from no response to the maximum intensity output to a threshold loss of near maximum intensity levels. The curve is generally flat. At the beginning of this report it was pointed out that the intensity of this war has had no parallel in history. It is not surprising to find a high incidence of functional deafness associated with combat exhaustion states. These cases respond quickly to proper treatment and a gratifyingly high percentage are returned to duty. This treatment is under the combined direction of the Section of Neuropsychiatry and the Section of Otolaryngology. In our department, cases were identified that suggested a functional basis for the hearing defect. We encountered two types: hysterical deafness, and simulated deafness or the malingerer. In the former, no response to any of the clinical tests employed could be obtained save one exception: normal response to cold caloric test. In the latter type discrepancies could be demonstrated in the response given to the usual malingering tests. Stenger's test and modification of this test were helpful in the recognition of this group of soldiers avoiding duty by simulating deafness. This was erroneously called "shellshock" deafness in the last war. Not infrequently the patient has had the advantage of preparing himself against discovery by the usual tests for malingerers. The necessary policy of swift evacuation of casualties placed him in a position to acquaint himself with every test commonly employed in identification of malingerers as he passed from hospital to hospital toward the rear. Of necessity, I developed a test referred to as the "Real Life Test" in counter-distinction to the usual clinical tests carried out in the ward or in the clinic. Essentially the test is as follows: The patient who is suspected of malingering is observed for any mark of easy identification, *e.g.*, height, weight, scars of the face, mannerisms, modes of dress, wearing apparel, gait, speech and/or mark of regiment or arm of service with any award or ribbon of distinction. Lacking these, it has been my practice to tell the patient that I wished to treat the ear and place in the canal, cotton dyed with any chosen color. This information is given

to the American Red Cross Assistant Field Director attached to our hospital. In this manner it is possible to casually observe the patient in an environment free of any evidence of challenge. These observations are made only in the area assigned to the Red Cross department. Here, the soldier is relieved of any stigmata of the war he finds unpleasant. The trained Red Cross personnel are ideally disposed toward the collection of this "nonprofessional" data. With these individuals the soldiers feel nearest home. He wishes to make a favorable impression upon the Red Cross workers and strives toward that end. Often the patient forgets his alleged hearing impairment and takes part in "home talent" shows. He is keen in competitive games and behaves entirely unlike the character observed by the doctor, nurse or ward attendant. The test has been valuable in those cases who have astutely managed negative responses to the test ordinarily employed. The information obtained by this method has not been found in error and has not infrequently indicated the avenue of correct therapy.

The psychiatric treatment chiefly consisted of a release of pent up emotions generated in battle. This was effected through the use of intravenous sodium amytal or sodium pentothal. Ordinary forms of individual and group psychotherapy were then employed. Thus anxieties, conflicts and guilty feelings were released. With these therapeutic measures and the reassurance of the psychiatrist, the patient was enabled to regain his confidence and re-employ his abilities in the war effort.

A tabulation of the Army and Civilian occupations is as follows in order of frequency:

I. Army Occupations:

1. Rifleman — infantry.
2. Artillery corpsmen.
3. Tank corps personnel.
4. Machine gunner.
5. Combat engineers.

6. Ambulance drivers.

7. Truck drivers.

8. Runners.

9. Signal corpsmen.

10. Administrative personnel.

11. Medical corps personnel.

12. Paratroopers and air corps personnel (these are not ordinarily seen at this institution).

II. Civilian Occupations:

1. Laborers (all classes of day, unskilled laborers, etc.).

2. Farmers and farm hands.

3. Sedentary employments (clerks, small business owners, etc.).

4. Technicians (radio, electricians, cabinet maker, carpenters, etc.).

5. Students.

The frequency of the type of traumatizing agent is as follows in order of incidence:

1. Shell (HE), artillery, 60, 75, 81, 88, 105, 155, 205 (88's most common).

2. Mortar fire.

3. Mines, teller, antitank (plastic).

4. Bazooka and armor-piercing shells.

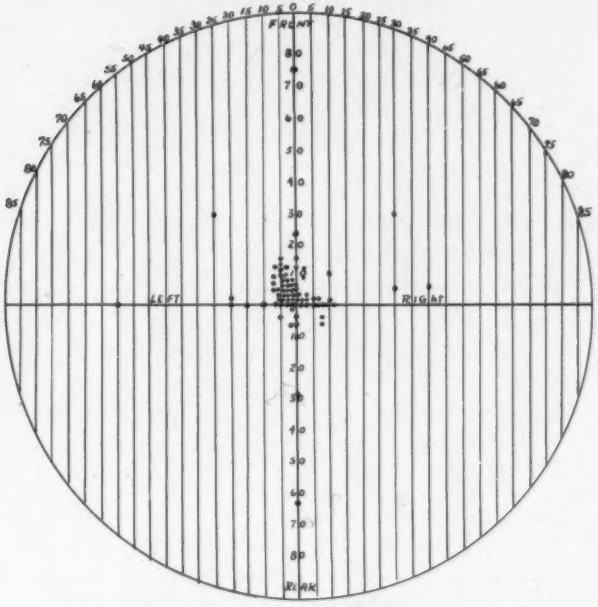
5. Grenades — concussion.

6. Others, screaming mimi, muzzle blast (75 tank gun), antipersonnel shell, rocket, aerial bomb, primacord, rifle and rifle grenade.

The commonest experience of those wounded in action was a barrage. The expression that "shells were falling all around me" is the most frequent description of the soldier's impression to the conditions immediately preceding his injury. The distance and location of the explosion is graphically illustrated by Fig. 11.

Out of 100 cases surveyed in this group, it will be observed

DISTANCE AND LOCATION OF TRAUMATIZING NOISE FROM PATIENTS.



Front (direct)	7	Right-Front	13
Rear (direct)	5	Left-Rear	3
Right (direct)	7	Right-Rear	2
Left (direct)	9	Unknown	25
Left-Front	29	Total	100

Fig. 11. Schematic representation of the incidence of shell, mine and other explosions in terms of distance and location (100 casualties). It will be observed that the front left area is highest in incidence. Next in frequency is the right front area. Only sporadic distribution is observed outside the radius of 20 feet. The explanation offered for this pattern would seem to imply that the left ear incurring temporary deafness associated with the noise of his own weapon's fire sufficiently impaired the soldier's hearing on that side to the degree that he was more vulnerable to missiles striking this area. It may be hypothesized that under ordinary conditions an equal number of shells would fall to the right and left of the midline. If this assumption is accepted, the above findings indicate that the better functioning right ear gives sufficient warning of danger originating from that side, thus enabling the soldier to take the necessary precautionary action.

that on eight occasions only did the detonation occur in back of the soldier's position. The increased density of the left and left frontal frequency of detonating area is striking when compared to the right and right frontal area. The low incidence of peripheral detonation (20 to 85 feet) productive of wounds incurred in action is indicated by rarely occurring dots in this zone.

The explanation of this graphic pattern of detonating noise can be made only on the basis of the ear's ability to perform its normal function of the location of sound. The direction from which a sound is coming normally can be determined by the relative intensities in the two ears and time of arrival at the two ears. Examination of the curve obtained in the control Group II suggests the tendency toward greater impairment in the left ear. This is particularly true in a selected group of rifleman class. The tendency to cock the hat to the right further predisposes the rifleman to the effects of the shock impulse created by his own weapon. Further, the highest incidence of the casualties studied in this group of cases were riflemen; therefore, it is reasonable to assume that a state of temporary deafness is produced in the left ear caused by the traumatizing action of the soldier's own rifle fire. It would follow that this temporary deafness predisposed these soldiers to wounds from left-sided explosions as a direct result of the failure to appreciate the approach of a missile from that side. Certainly the ability of artillery to "zero in" on a target would not be of this unilateral nature. Equal numbers of shells probably fall right and left of the midline, but the absence of temporary deafness of the right ear enables the soldier to take cover in adequate time, thereby avoiding injury. Thirty-six of the men in this series were unable to give any description of the location or direction of the explosion. It will be recalled that these men were wounded most frequently by artillery barrage. It is, therefore, likely that in the case of these men, unable to indicate direction, distance or location of the explosion, had been deafened previously to the period in which they were wounded. The additional possibility of the detonation taking place out-

side of the frequency of the ear's hearing range must also be considered.

The auditory sensation from the subjective experience was not infrequently described in vague terms as "whoosh, a rush of air, a hell of a blast." To the question, "What did it sound like?", many of the answers were: "I think I heard the explosion, but I can't describe it."

A complete report on the type, area involved. severity and extent of the injuries to the tympanic membrane is not expedient at this time. It may be stated, however, that the most common finding on otoscopy was the normal or near normal drum. Clinically one saw injuries so mild that the trauma would have been missed except for the routine use of Siegle's speculum. From this moderate drum injury, manifested by slight and localized interstitial hemorrhage, one could see all gradations of tympanic injury up to total destruction of the eardrum. Most of the perforations had sharp irregular edges, but some were so slight that identification could be made only after the air the patient described as "coming out my ear when I blow my nose" had been objectively established by employing the oscultation tube. In these cases the perforation had a rent-like appearance and was placed frequently anterior-inferior at the junction of tympanum and canal wall. In the perforation of the small "hole-like" variety, their position most commonly was anterior to the malleus — and not uncommonly in small multiple perforations in front of and behind the malleus on a level with the umbo and placed half way between the umbo and the annulus toward three and nine o'clock. The larger perforation had a "kidney shape" with the lesser curvature directed parallel to the annulus, removed a few millimeters from the drum periphery. These larger perforations were frequently associated with clotted blood casts extending into the auditory canal. Discharge was uncommon; rarely did a case present a full scale acute suppurative otitis media. The method of treatment was limited to removal of clots by suction employing a suitable metal suction cannula. In case the clot was uninfected and resistant to gentle suction, no effort

was made towards removal by strong suction. At no time were applicators, hooks, ear drops or irrigations employed. Either the ear was not treated (in the case of dry middle ears) or at most, a sterile cotton pledget was placed in the canal. The occasional use of penicillin — sulfathiazole powder was employed in those cases that did not respond to routine treatment. It is my impression that this agent demonstrated value, but it must be admitted that the cases thus treated were neither great in number nor long under observation.

An effort was made to ascertain the possible forces acting upon the drum producing the perforation. It is interesting that many cases were found to have small pellets of soil, brick, stone and other foreign debris in the canal. This phenomenon was observed in canals of patients who had suffered only small to large perforations of the tympanum as well as in those patients who had no clinical evidence of trauma to the drum. Rupture of the eardrum was observed in cases having only slight to moderately large cerumen impactions. A complete obstruction to the canal by a cerumen cast did not in any case demonstrate a drum perforation. This is a dubious situation, inasmuch as it has already been stated that perforating wounds to the eardrum have been observed in soldiers having "moderately large" cerumen deposits in the canal. Whether or not a total closure of the canal by a cerumen impaction affords adequate defense against perforation is debatable. It is possible that occlusion of the canal by a cerumen impaction might defend the drum from the longer lasting negative action of the shock wave.

Examination of the edges of the large perforations reveals some interesting findings. Using a curved attic cannula irrigation needle for a suction tip, one may "draw" into the tip of the needle irregular, triangular tongue-like bits attached to the periphery of the perforated drum when the suction is applied into the middle ear through the perforation. The possible explanation of the inwardly placed drum remnants is likely to be due to the conical shape of the drum which permits an inward "fall"; however, there is the possibility

that the drum was rent by the short but intense positive wave of the shock pulse driving the drum tissues inward at this time. Further observations are being directed along this avenue of investigation and will be reported later.

In the Group I series, perforation occurred in 37.1 per cent of the cases. Further analysis on the basis of 199 ears* relative to perforating wound is as follows:

			Per Cent
1. Complaint ears	....	147	73.9
Perforation	67	.....	45.6
No perforation	80	.....	54.4
2. Noncomplaint ears	....	52	26.1
Perforation	6	.....	11.5
No perforation	46	.....	88.5
3. Total ears	....	199	.....

When reliable information can be obtained a more accurate evaluation of the hearing loss and prognosis can be made in terms of the explosion producing the damage and the distance from the casualty. From the cases of this study it was impossible to form a judgment of hearing impairment on the basis of the objective damage to the tympanic membrane or related structure of the ear exposed to the influence of the shock pulse. It has been previously shown that perforating wounds of the eardrum sometimes are unknown to the patient. Normal hearing acuity has been demonstrated in many of the cases exposed to a shock pulse sufficiently violent to rend the eardrum. In the main no direct correlation can be made between the amount of hearing loss and the amount of traumatic injury to the conductive mechanism.

An interesting observation in the cases studied was the absence of complaints indicating injury to the receptors of dynamic and static equilibrium. The possibility that the semicircular canals, the utricle and saccule are protected by the anatomical position they occupy in the temporal bone might be associated with the infrequent complaint of dizziness. Conversely, the cochlear portion of the labyrinth is exposed to the direct effects of blast by way of the oval and round

*One ear disqualified on basis of previous ear disease.

windows and the promontory.* Another possible explanation could be the masking effect of other wounds and the patient's sharper interest in the hearing impairment he has sustained. It will be admitted that these are hypothetical issues, but it can be definitely stated that dizziness was an infrequent complaint.

Diplacusis was not present in any of the cases studied. No logical explanation is offered for this unexpected situation. The patient was given every opportunity to express in his own words all the ear difficulties that troubled him subjectively. Admittedly the practice of obtaining a history through leading or direct questioning was conscientiously avoided.

COMMENT.

It is not intended to suggest that audiometric curves are infallible in the diagnosis of acoustic trauma. Every soldier whose auditory apparatus was exposed to blast effects of combat must not necessarily present a scotoma at 4,096 cycles. Conversely, it cannot be assumed that a threshold increase for 4,096 cycles indicates only acoustic injury incurred in combat; yet, when it comes to an analysis of the audiometric patterns here presented, it will be observed that a characteristic curve is found in the majority of cases. It may be dogmatically stated that a diagnosis of "combat-incurred acoustic trauma" can be made in a high percentage of the cases of combatant personnel by a routine history, careful physical and psychiatric survey and application of auditory tests. This procedure is of prime import to the Army otologist confronted with the obligation of properly caring for the patients who come under his charge. The triage of these cases would be difficult were it not for established criteria. By these standards one may form a correct judgment and return to duty those cases with adequate hearing. He may retain others for treatment, observation and, if necessary, reclassification and reassignment to limited duty if he believes the soldier's hearing would make him a liability to his outfit. Physicians in the military service are not in a

*One case of the series demonstrated a fracture of the promontory—total deafness but no complaint of dizziness.

position to moralize the issues of war. It is his duty to support the primary function of the Army, *i.e.*, combat. By proper identification of the causes of the soldier's deafness he is in a position to render treatment on the rational basis of a correct diagnosis. The Army otologist recognizes the impossibility of curing all cases of deafness encountered in a clinic where he sees patients with all types of destructive wounds to the hearing organ; however, he will also see a great number of men complaining of deafness incurred in combat that is on a functional basis. Properly diagnosed and treated, a large number of these cases may be returned to duty.

From the evidence presented in this study it is apparent that acoustic trauma in the ground forces is a factor of great importance. Measures must be taken to provide greater protection. The threshold elevation at or near 4,000 cycles has long been known to occur in boilermakers' deafness.[1] Similar reports have appeared in the literature describing the "aviators' notch" in personnel exposed to the noise of airplanes.[2] Frequently used descriptive terms are: tonal dip, high frequency loss and 4,096 dip. The terminology should be standardized since it is evident that exposure to loud sounds from whatever source tends to produce the maximum loss around 4,000-6,000 cycles, the depth of the depression of the dip bearing a relationship to the intensity of the source rather than to the agency from which the sound originates. In the work carried out in this study, "acoustic interval" and, more rarely, "acoustic scotoma" were used in the protocol to describe the tonal dip at 4,096. To avoid additional confusion, this expression was not used in this report. It is offered only at this time in the form of a suggestion.

The explanation of the tonal dip at 4,096 still is wanting. The duration, intensity and frequency of the traumatizing force in the cases of this report is unknown. Knowledge of other observers existing at the present time indicates that the 4,096 dip is experimentally induced by exposure to 2,048 cycle fatiguing tone; further, that the maximum dip occurs an octave above the fatiguing tone in the high frequencies. The curve of this series of cases demonstrated a maximum

dip at 4,096. The question raised by this activity is: Does the noise of combat possess a similar tone quality? Many of the riflemen described the sound of a bullet striking the helmet as a "ping" or high-pitched crack. The tankman's auditory sensation was described as a bell or gong effect. Does the helmet or tank when hit by enemy fire set into motion these metal bodies capable of vibration? Is there a resultant source of acoustic trauma from the vibrating helmet or the tank? Do the supersonic frequencies outside the hearing range contain harmonics that are related to the tonal dip at 4,096 cycles? What is the relation of the latency period to acoustic trauma? What is the effect of high frequency sound waves reflected from metal surfaces during latency period, *i.e.*, meter beat effect? These and many other avenues of investigation must be subjected to critical clinical, experimental and histopathological study. Additional research must be made relative to the influence of the pulse wave on the auditory apparatus in the production of the phenomenon under discussion.

The suspension of the ossicles by the fan-shaped ligament of the incus and the anterior ligament of the malleus reduces the small mass of the drum and ossicular chain (0.05 gm.) to an insignificant factor. The ability of the ear to follow vibrations as slow as 1/20 of a second up to the speed of 1/20,000 of a second indicates the efficiency of the mechanism. Moreover, the sensitivity of this special sense organ is exemplified by the sense of sound objectively experienced when the malleus is displaced through an amplitude less than the diameter of a hydrogen molecule when stimulated by a 3,000 cycle wave. The integrity of these structures is a dominant factor in the conduction of sound. If the destructive power of the shock pulse is directly acting upon these vulnerable tissues a hearing defect is to be expected. In the event of the shock pulse acting directly upon the conductive elements of the ear by way of the external auditory canal a condition is effected that would focalize the energy of impact to a relatively small area. The drum placed between two air chambers having normally equal pressure might be uninjured by the propagation of the shock pulse through the

canal. While the drum might escape injury under these conditions, a different reaction must be expected in the middle ear spaces from which the "locked-in gases" are not easily discharged. It would follow that the prevention of egress of the gases by the relatively closed Eustachian tube results in a displacement of the gases to other parts of the middle ear. In this way it is possible that the destructive effect of the shock pulse may be directed to the cochlea by way of the oval and round windows. Thus, trauma to the organ of Corti is produced as a direct result of the violence of the shock pulse.

SUMMARY AND CONCLUSIONS.

1. Combatant personnel exposed to the effects of battle noises has demonstrated a tonal dip maximal at 4,096 cycles when tested in a soundproofed room with a standardized audiometer.

2. Ear injury incurred in combat as manifested by a tonal dip could be recognized before the speech frequency range was affected. The application of this knowledge proved to be a satisfactory basis for classification and ultimate disposition of the soldiers seen by the otologist.

3. Ears with hearing impairment existing prior to military service when exposed to noise of combat proved to be as vulnerable as normal ears.

4. No correlation was found between the degree of objective eardrum injuries and the degree of hearing impairment.

5. Aural battle casualties presented a paucity of complaints referrable to the receptors for equilibrium and, more rarely, of diplacusis. Deafness was commonly associated with tinnitus. In those cases complaining of tinnitus, only the maximum threshold elevation was at 11,584 cycles.

6. A method of detection of malingerers was developed: Real Life Test versus clinical test.

7. Temporary deafness of the left ear caused by the muzzle-blast from the soldier's own rifle, appeared to predispose

to combat injuries from explosions occurring in the area of the soldier's left side.

8. Hysterical and simulated deafness was not uncommon. These two types of deafness responded well to proper identification and treatment.

9. No evidence was found that would indicate a "cumulative factor" in acoustic trauma.

The author thanks Maj. Ellis Bonnell, Capt. George Perkins, Miss Catherine Little, Assistant Field Director American Red Cross, and Miss Elizabeth Moomaw, American Red Cross, for their assistance in preparing this paper.

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MEDIASTINAL AND SUBCUTANEOUS EMPHYSEMA OF FOREIGN BODY ORIGIN.*

GUY M. MANESS, M.D.,
Nashville, Tenn.

In this instance of mediastinal and subcutaneous emphysema due to a foreign body, J. G., a white boy, aged 7, entered Vanderbilt University with the history of strangling on a peanut. Four days prior to admission, the patient was eating peanuts when he suddenly began to cough and have difficulty in breathing. His local doctor saw him on that day, but he was not coughing, and his only complaint was shortness of breath and general malaise. Treatment with sulfadiazine was begun. In the next three days the temperature was in the range of 101° to 102° F. It was noticed that the soft tissues of his neck began to swell. On the morning of admission wheezing was audible. The past history was noncontributory; the family history showed that his mother had influenza during the patient's illness.

Physical examination showed a well developed but acutely ill boy of 7; temperature, 102°; tonsils absent; slight injection of pharynx; definite symmetrical swelling of soft tissues of neck, no redness or induration. He had crepitus which was due to subcutaneous emphysema. The right side of the chest appeared fuller than the left, but it did not expand as well as the left. There was hyper-resonance over the right side of the chest posteriorly. Breath sounds were bronchovesicular over the left chest but were bronchial in type over the right upper. In the right base they were definitely diminished. The remainder of the physical examination showed no abnormality.

The admission urinalysis was not remarkable; there were no cells or casts in the sediment. The admission white cell

*Presented at the meeting of the Nashville Academy of Ophthalmology and Otolaryngology, Nov. 19, 1945.

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, Dec. 3, 1945.

count was 12,600. Red count, 3,760,000. The hemoglobin was 13 gm. Kahn was negative.

X-ray film of the chest on admission showed no pneumonic process in either lung. The mediastinum had shifted slightly to the left. There was pulmonary emphysema in the right base. Air had escaped into the mediastinum and into the soft tissues of the neck. There was small pneumothorax on each side.

Pediatric consultation was obtained. It was felt that the patient's temperature was not due to pneumonia, but instead was a febrile reaction to sulfadiazine. It was agreed that a general anesthetic was not contraindicated.

Bronchoscopy was done under general anesthesia. A 6 mm. bronchoscope was introduced into the trachea through a small laryngoscope. A half peanut was removed from the right lower bronchus with a grasping forceps.

The postoperative course was quite smooth. There was no respiratory difficulty whatsoever. The chest was clear to percussion and auscultation. The subcutaneous emphysema spread from the neck down for a short distance over the anterior chest wall. A maculapapular rash was observed over the patient's back, but this improved before discharge. The temperature averaged about 100° in the first postoperative day and was normal thereafter.

Repeat X-ray film of the chest on the third postoperative day showed the lungs to be clear. The pneumothorax had disappeared. There was still mediastinal emphysema and subcutaneous emphysema of the neck. Patient was discharged on the fourth postoperative day.

119 Seventh Avenue North.

IN MEMORIAM

ROBERT LEVY, M.D.,

1864-1945.

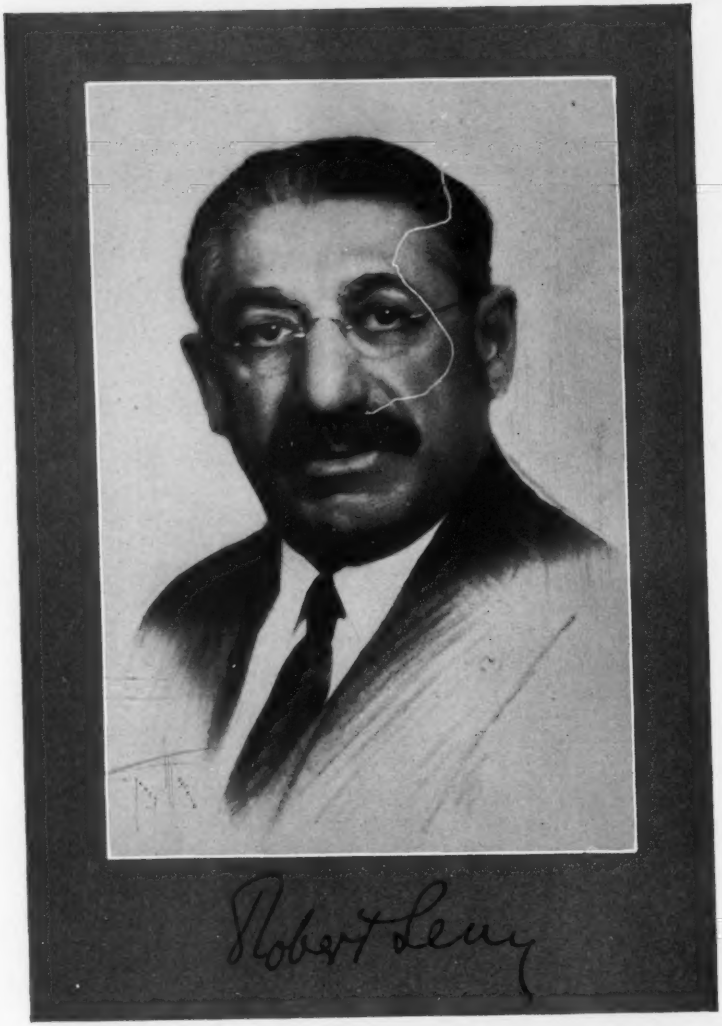
Dr. Robert Levy died at his home, 1215 Detroit Street in Denver, Sunday evening, July 1, 1945. He was born May 30, 1864, in Hamilton, Ontario, Canada.

It was natural that Dr. Levy should choose medicine as a profession as his granfather practiced medicine in Syracuse, N. Y., until his death. Dr. Levy also had three uncles engaged in medicine: Dr. Henry L. Elsner, Professor of Medicine at Syracuse University, New York; Dr. Simon L. Elsner, who practiced urology in Rochester, N. Y., and Dr. John Elsner, who was Professor of Medicine at Gross Medical College in Denver, Colo.

On Aug. 27, 1889, Dr. Robert Levy married Rebecca Goldsmith in Trinidad, Colo. They had two daughters: Mrs. Leona L. Eichberg and Mrs. Samuel Rose, of Denver, Colo.

After finishing high school, Dr. Robert Levy attended the College of Liberal Arts at the University of Denver. Later he went to Bellevue Hospital Medical College where he received an M.D. degree in 1884 after two years of study. He located in Denver, where he engaged in general practice for five years. Following five years of general practice, he began to limit his practice to otolaryngology. He went to Europe in 1906, where he studied in Vienna, Berlin and Freiberg. He learned from Prof. Gustav Killian, at the University of Freiberg, the technique of submucous resection of the nasal septum. Dr. Robert Levy was the first rhinologist to use and demonstrate this modern operation in the Rocky Mountain region and he was one of the first to introduce it in America.

Dr. Robert Levy held membership in numerous medical societies, including the American Academy of Opthalmology and Otolaryngology (Life Member), which he joined in 1896;


Robert Lewis

the American Laryngological, Rhinological and Otological Society, which he joined as a charter member in 1895; the American Laryngological Association, and the American College of Surgeons.

Dr. Robert Levy was Professor of Laryngology, Rhinology and Physiology, Gross Medical College, Denver, 1887-1895; Professor of Otolaryngology, Gross Medical College, 1895-1902; Professor of Otolaryngology, Denver and Gross Medical School, 1902-1912; Secretary, Gross Medical School, 1892-1902; Secretary, Denver and Gross Medical School, 1902-1909; Professor of Otolaryngology, University of Colorado School of Medicine and Hospitals, 1912-1935; and Professor Emeritus, July 1, 1935, to July 1, 1945.

He was president of the Colorado State Medical Society in 1896, and of the Colorado Otolaryngological Society soon after its organization. He was chairman of the Section on Laryngology, Otology and Rhinology of the American Medical Association in 1912 to 1913. He was a charter member of the American Laryngological, Rhinological and Otological Society when it was organized in New York City in 1895, and he was its president at its meeting in Chicago in 1915. He was a charter member of the Denver Clinical and Pathological Society and its president three times. He was president when the Society celebrated its fiftieth anniversary and a dinner was given by the Society in his honor. He was made president emeritus of the Society in 1933. On April 4, 1934, an oil painting of Dr. Robert Levy, made by Waldo Love, was presented to the Denver City and County Medical Society at a dinner at the Cosmopolitan Hotel. This occasion marked the fiftieth anniversary of Dr. Robert Levy's medical practice. He was one of the founders of the National Jewish Hospital in Denver and a member of the Medical Advisory Board for 46 years. He was chairman of the board the last 35 years of his life. He was a trustee of Temple Emanuel for 40 years. He served as vice-presirent, president and later honorary president. He was a 32nd degree Mason and active in El Jebel Temple (Shrine). He was an honorary Fellow

of the American Laryngological Association from 1943 to 1945. His active Fellowship began in 1914.

His contributions to medical journals were legion, well prepared and contained information valuable to the progress of his specialty, and he attended many local, state and national medical meetings where he discussed papers read at the meetings.

Dr. Robert Levy was concerned with all philanthropic and communal activities. He participated in the organization of the local Community Chest and several years ago a medal was presented to him for his outstanding service.

During a tour of Japan in 1923, he made the principal address at the dedication ceremony of a hospital and medical school in Tokyo, and delivered a series of lectures and demonstrations.

Dr. Robert Levy was given a certificate, without an examination, by the American Board of Otolaryngology in 1925 on account of his high professional standing in his specialty.

In World War I, Dr. Robert Levy was commissioned a First Lieutenant, M.C., U.S.A., July 26, 1917. He was head of the medical board in Denver which conducted examinations for all candidates for the aviation section of the army in World War I, with rank of Major.

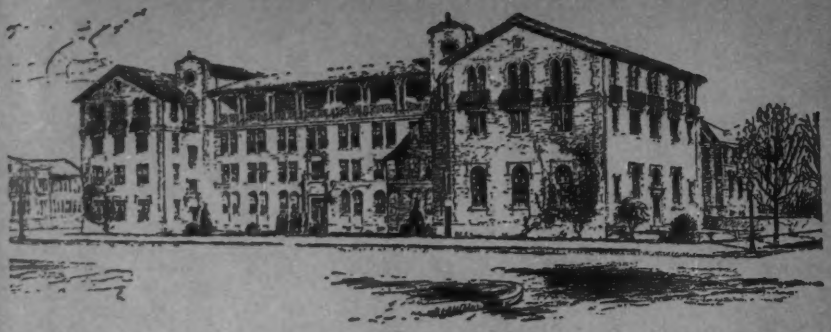
Dr. Robert Levy conducted a large private and consultation practice in Denver for almost 60 years. For many years he was the foremost otolaryngologist in the Rocky Mountain region and took an active and leading part in medical education for over 50 years. He was always ready and willing to help younger otolaryngologists. He will be missed by his colleagues on and off the medical faculty. His counsel was sought by physicians and laymen, and his wise judgment was of the best. T. E. W.

AMERICAN BOARD OF OTOLARYNGOLOGY.

The next examination of the American Board of Otolaryngology will be held in Chicago at the Palmer House from May 22 to 25.

MISSISSIPPI VALLEY MEDICAL SOCIETY TO MEET IN ST. LOUIS, SEPT. 25, 26, 27, 1946.

The eleventh annual meeting of the Mississippi Valley Medical Society will be held Sept. 25, 26, 27, 1946, at the Hotel Jefferson in St. Louis. D[illegible] to the fact that no meeting was held in 1945, all the officers of the society have been retained for another year. These include the president, Dr. Grayson L. Carroll, of St. Louis; president-elect, Dr. Walter A. Sternberg, of Mt. Pleasant, Iowa; first vice-president, Dr. Louis H. Jorstad, of St. Louis; second vice-president, Dr. Elmer E. Nystrom, Peoria, Ill; third vice-president, Dr. E. J. Lessenger, New London, Iowa; secretary-treasurer, Dr. Harold Swanberg, Quincy, Ill.



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